



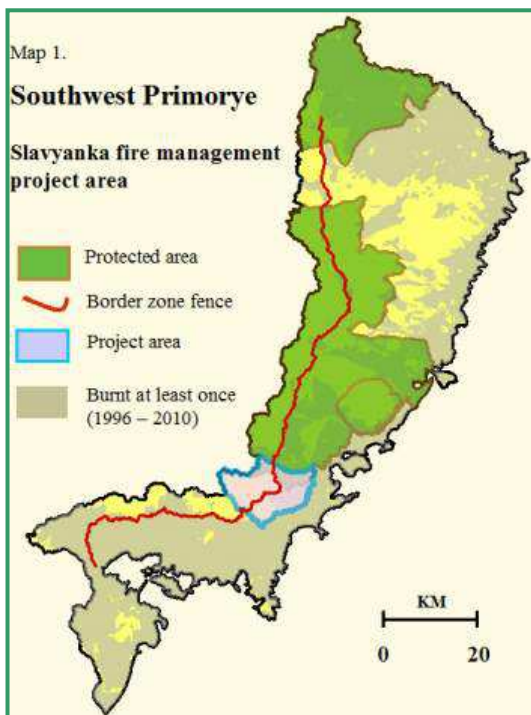
Wild Fires in Primorski Krai

A cost effective solution to the problem



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- Slavyanka Municipality, Khasan District, Primorsky Krai
- Wildlife Conservation Society, Russia Program



Introduction

Since spring 2009 the Wildlife Conservation Society (WCS) and Slavyanka Municipality (Khasan District, Primorsky Province) have been operating a fire management project aimed at reducing wild fires in a 280-k m² project area in the Slavyanka Municipality (see map 1). After a development phase in 2009, this program succeeded in reducing the area that burnt by an estimated 83% in 2010 and 99% in 2011 in comparison to what would have burned in absence of our interventions.

This approach is a simple combination of effective fire-fighting and behavioral modification of local people to reduce the number of fires that have to be fought.

This paper briefly explains our experience and examines whether similar approaches may be

applicable elsewhere not only in Primorye, but across Russia.

In this paper we discuss the following topics:

1. Project background
2. Our approach to fire management
3. Project results
4. Project costs
5. Recommendations

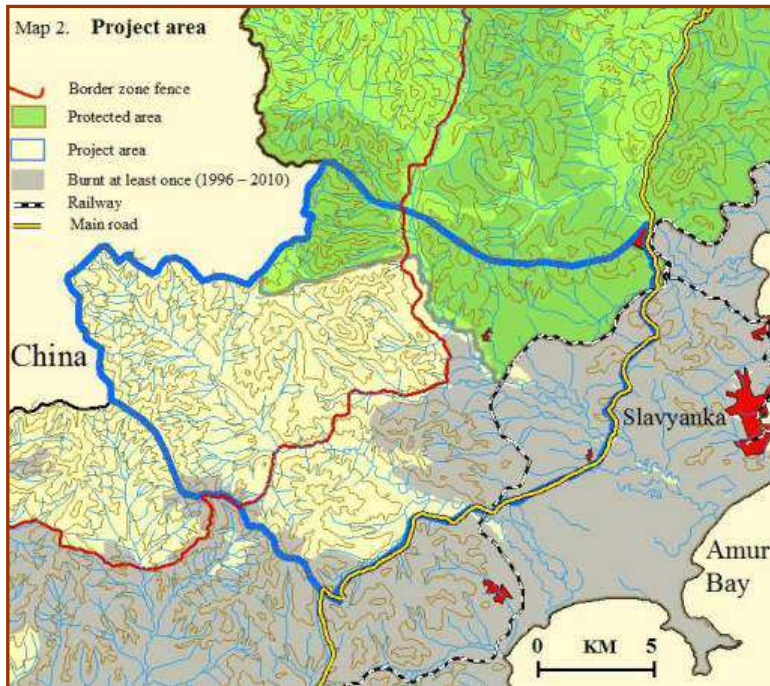
1. Project background

Wild fires are increasingly recognized as a serious problem in Russia, especially after the devastating fires in 2010, which blanketed Moscow with smoke, destroyed crops and thousands of homes, and claimed more than 50 lives. Wild fires in Russia do extensive damage to forests and are an important source of black carbon emissions contributing to global warming and melting of the Arctic permafrost ice.

Our project area in Southwest Primorsky Krai is a biologically rich area with temperate forests and a unique complex of flora and fauna. Southwest Primorye has one of the highest annual rainfalls in all of Russia and in its natural state, is covered in a luxuriant forest of mixed coniferous and deciduous trees with lush understory and many lianas. The region is home to many endangered species, including the Amur tiger and Far Eastern leopard. The value of this region is reflected in an extensive protected area system. The UNESCO Biosphere Reserve Kedrovaya Pad and the Leopardoviy Wildlife Refuge in the central part of Southwest Primorye will soon be merged into a National Park to effectively protect this national treasure.

Unfortunately, Southwest Primorye suffers probably more than any other part of Russia from frequent ground fires. Satellite monitoring indicates that approximately 55% of Southwest

Primorye burns at least once every 10 years. These fires destroy forest habitat for highly endangered species, including the Amur tiger and Far Eastern leopard, and have a negative impacts on human health and the local economy. Recurrent fires over the past century have converted large forest tracts into low value grasslands, with little possibility of natural regeneration. Today only 57% of the region remains forested.



In 2009, the Slavyanka Municipality and WCS began a management program to reduce wild fires in the western part of the municipality between the federal road bisecting the area and the Chinese border. The project area covers 280-km² of the 460-km² municipality lands and includes a variety of landscapes with lowland plains and hills of up to 646 meters, as well as the southernmost part of the Leopardoviy Wildlife Refuge. The main habitat types are grassland, crop fields and open fire-degraded forest. Closer to the Chinese border, forest that have suffered less fire damage retain a

combination of deciduous and coniferous tree species. The most common ignition points for fires in the project area are the main road, the railroad, dachas (country houses) and small settlements, but fires do also break out in the forestlands.

2. Fire management in Slavyanka

The approach to fire management that we have developed and implemented is simple and cost effective. It includes the following components:

1. A mobile fire-fighting brigade.
2. The appointment of local fire wardens in communities to control and police the burning of fields and garden plots during high risk seasons.
3. A more rigorous prosecution of perpetrators who have started illegal fires – which usually results in monetary fines.
4. Monitoring burns on a yearly basis in the project area and in the whole of Southwest Primorye to assess success of our efforts.
5. Additional project components include:



- Creation of firebreaks.
- Increasing public awareness of the need to prevent fires.
- Improved co-ordination between agencies and field staff.



Fire-fighters use air-blowers to remove fire fuel from the forest floor and extinguish flames. They do not carry water bags as this would impair mobility and therefore a fire truck with a water tank is unnecessary, also improving mobility and access in the hilly terrain. After a fire has been extinguished, a fire-fighter remains at the spot to ensure it does not re-ignite.

1. Fire-fighting brigade

A 10-member volunteer brigade was established to fight wild fires during the autumn and spring fire seasons. The length of the season varies from year to year, but most fires occur in October, November, March and April. The brigade fights fires in the project area as well as in surrounding areas when fires represent a threat to the project area. On average about 70 fires are fought annually. Each team member is equipped with a high-pressure air-blower for extinguishing fires and a fire-protective outfit (a mask, gloves, boots and overall). Three to four team members survey the area for fires from high-elevation lookout posts while the

other members patrol in a minivan. The team members communicate using two-way radios (a fixed set in the van and hand-held sets for the outposts) as well as with cellular phones. The combination of observations from the look-out posts and patrolling ensures that fires are spotted quickly. When the team is immediately dispatched and fires are still localized, it is usually possible to quickly extinguish fires before much damage is done. If a fire is difficult to control, additional team members are collected from the look-out posts. During peak days with many fires, the fire brigade is expanded from 10 to 15 members, with new volunteers manning the lookout posts and experienced team members fighting fires full-time.

2. Fire wardens

The Slavyanka municipality has appointed village fire wardens in small settlements within high-risk fire zones. The wardens contact all households at the start of every fire season (twice a year), provide instructions about fire safety, and request that local residents sign a statement in which they promise to observe fire safety regulations, the most important of which is that no fires are started during the fire season – for either garbage, fields or vegetable gardens. The villagers are asked to report fires that they spot to the warden or directly to the fire-fighting brigade (leaflets with telephone numbers are handed out at the start of each season). Wardens

also report fires - a substantial portion of the fires that were fought during the project period were identified by fire wardens.

3. Fining perpetrators who have started illegal fires

After consultation with the Slavyanka Municipality, the local police and prosecutor now take a much sterner attitude towards illegal fires and prosecute a far greater number of cases. In 2010 eight people were fined for starting fires, which represents a dramatic change from previous years when virtually no arsonists were caught or prosecuted. All prosecutions were based on reports from wardens and the fire brigade. Although the fines were small (1,000 rubles, approximately \$35) they do form a significant deterrent for local people, many of whom are of very low income. In all but one case, the fires were traced to houses in small villages where adults did not heed warnings of the local fire warden and started a fire without attempting to hide or contain it. The warden system, the involvement of the police when illegal burns have occurred and the eight resulting fines have had a noticeable effect on the behavior of the villagers. In the spring of 2011, it was only necessary to write up one citation and the number of fires starting in or near small settlements in Slavyanka during this period significantly dropped.

4. Monitoring the effectiveness of the project

Monitoring areas burned on a yearly basis is essential to assess the effectiveness of the fire-fighting and prevention activities. The area burned in our project area and in the whole of southwest Primorye are monitored annually with use of satellite imagery. We have developed a database on historical burns since 1996, which enables us to accurately calculate reduction of burns in our project area. The method for calculating annual reduction in burns within the project area is described in Appendix 1.

It is important to recognize that it is the combination of the four main components that makes for a successful fire prevention project. Any single element in isolation is insufficient to reduce fires. For example, improving fire-fighting capacity alone is not effective if the behavior of local people is not changed as well. At the beginning of the project in 2009, the fire brigades were overwhelmed by the number of fires and were unable to address all of the sites simultaneously. Through the work of the fire wardens and penalties for perpetrators, the numbers of fires was substantially reduced in 2010 and 2011, which meant that the fire brigades were able to successfully and quickly contain those fires that did occur. It is the integration of all four components, fully and successfully implemented, that results in dramatic decreases in the frequency of fires and total area burned.

5. Additional steps

The fire-brigade, warden system, fines for perpetrators and monitoring form the four core components of our fire management model. But a number of additional steps have also been taken to further increase the effectiveness of this approach:

- i) The fire brigade is developing a firebreak system with use of a small bulldozer and by controlled burning. As of September 2011, a fire break network of about 70 kilometers has been created. So far all fires have been extinguished before they actually reached a break so we cannot claim that the firebreaks have directly contributed to our reduced burn area. However their presence is an important insurance in the event that the number of fires becomes unmanageable or if a fire gets out of control.
- ii) Efforts have been made to increase awareness about the risks and consequences of irresponsible behavior related to fire. Articles about the project and the need to prevent fires, and announcements at the start of fires seasons, are published in a local newspaper

each fire season. The fire brigade carries out additional education activities when they are not fighting fires, including the distribution of awareness leaflets in local settlements and posters at bus stops and other suitable spots. The education materials all call on local people to help prevent fires.

- iii) The Slavyanka Municipality appointed a staff member to co-ordinate the fire management activities and to liaise between the fire brigade, the wardens and police.



Creating a firebreak using controlled burning.

3. Project results

The main goal of our project is to reduce the burns sufficiently to facilitate recovery of the natural forest vegetation across the project area. After an initial development phase in 2009, when fires were not significantly reduced, we succeeded in reducing the area burnt in our project area by an estimated **83%** in 2010 and **99%** in 2011, compared to what would have burned without interventions¹. The method for calculating these results is explained in Appendix 1.

¹ The estimates of area burned for SW Primorye and specifically for the project area were calculated by an independent organization, the Tigis GIS-laboratory of the Institute of Geography of the Far Eastern Branch of the Russian Academy of Science.

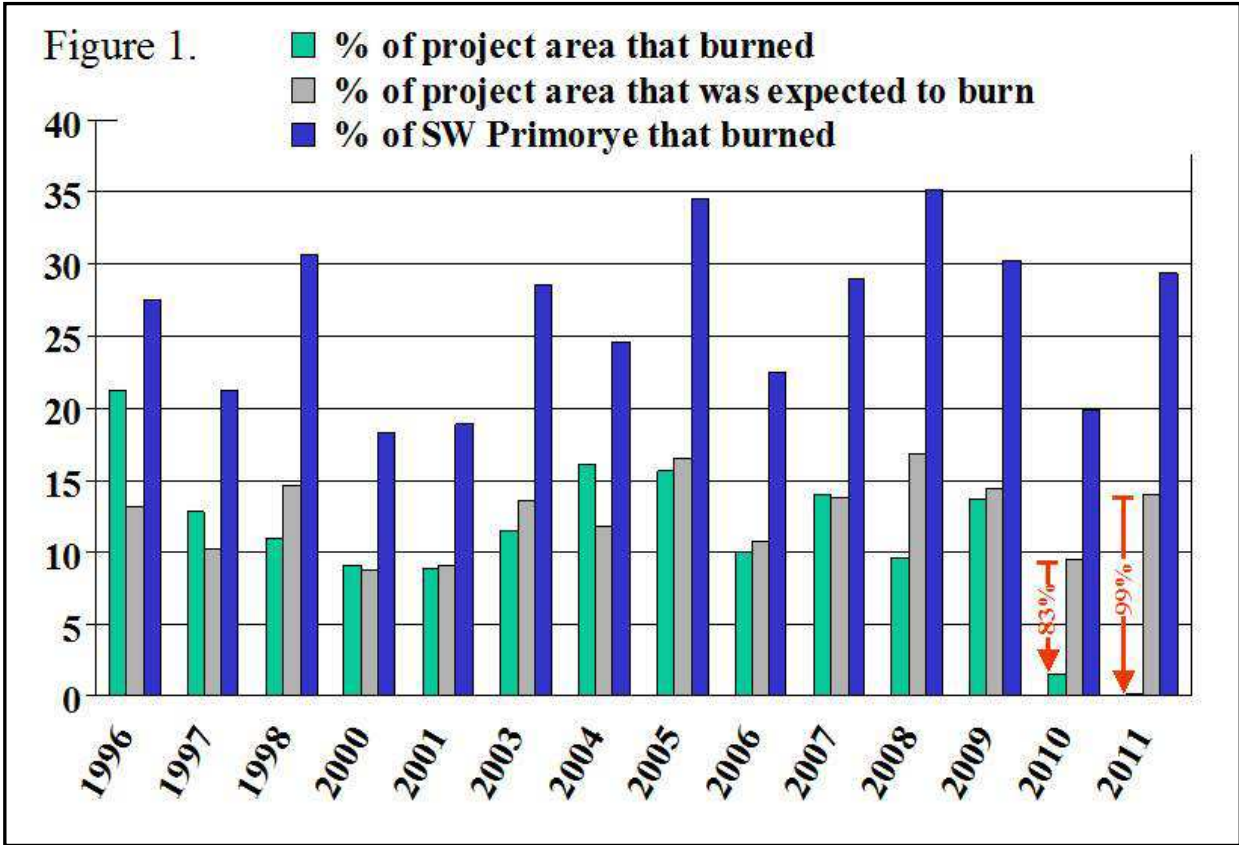


Figure 1 shows the percent of the project area that was expected to burn (i.e. in the absence of our fire-management interventions), the percent of the project area that actually burned each year, and the percent of Southwest Primorye that burned each year. See Appendix I for an explanation of how these were calculated.

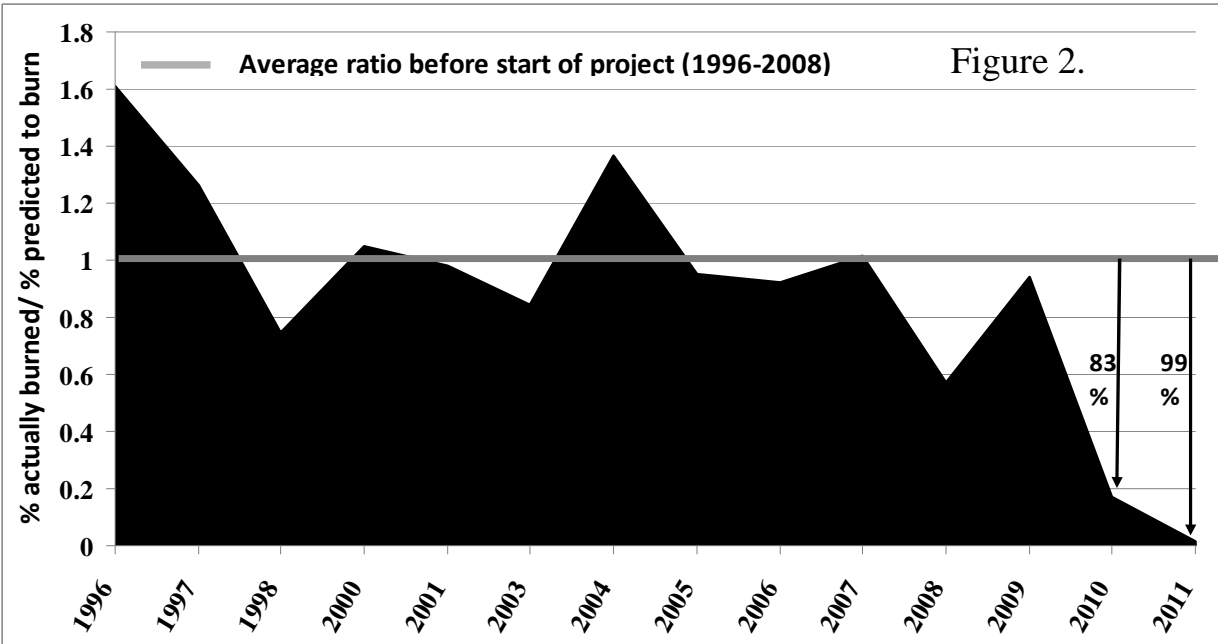


Figure 2. The ratio between the % of the project area that burned and the % of the project area that was expected to burn.

4. Project costs

The main expenditures for establishing the fire brigade and the annual costs for operating the brigade and fire prevention activities in the 280-km² project area are listed below.

Set up costs and equipment:

- One second-hand mini-van @ \$15,000
- One stationary @ \$1000 and 10 hand-held radio sets @ 150 = \$2,500
- 10 Husqvarna high-pressure air-blowers @ \$850 = \$8500
- 10 sets of protective fire outfits @ \$100 = \$1000

The annual operating costs of our project over two fires seasons are approximately \$7,000:

- Fuel for the mini-van (\$3,000)
- Fuel for high-pressure air-blowers (\$1,000)
- Spare parts, repairs, 2 replacement air-blowers, vehicle insurance (\$3,000)
- Monthly payments to fire wardens during two fires seasons
3 wardens x 4 months @ \$100 = \$1200

(Note; costs of education materials, salaries and preparing firebreaks with a tractor have not been included)

5. Recommendations

Results to date demonstrate that our fire management approach, employing an integrated suite of effective fire-fighting and community based interventions, with strong local government oversight and sufficient financial support, has been successful in our 280-km² pilot area of Slavyanka Municipality. We are confident that this model could be equally effective in reducing wildfires in other regions of Primorsky Krai as well as in other parts of the Russian Federation. This method is most suitable for regions with small, scattered settlements or areas with dachas (country houses) in combination with agricultural fields, grasslands or degraded forests that have a low commercial value and are not managed as part of the Russian Forest service. In such areas, fires are usually frequent and intensive (due to thick vegetation on the ground) and, fire-fighting capacity is often not as well organized or managed.

Steps needed to implement such a program include:

1. Designation of a responsible governmental body (e.g. a municipality) and a project manager who is a staff member of this government body.
2. Creation of a seasonal fire brigade adequately equipped to fight fires, be in constant communication with each other, and with education materials to hand out to local people.
3. Designation of fire wardens to monitor fires and whether fire safety regulations are observed at all settlements in the project area.
4. Coordination of responsibilities and activities by all relevant parties (brigade, wardens, police), led by the lead agency. The parties should meet in September and January to ensure adequate and timely preparations for the coming season. Debriefing meetings should be held twice annually with the wardens and brigade members at the end of each fire season to discuss what went right and wrong and agree on steps for improvement.
5. Monitoring of project results with use of satellite imagery. The results of the previous autumn and spring fire seasons should be available for evaluation at the stakeholder meeting that is held in September to prepare for fires in autumn.

Appendix 1. Method for calculation of project results

The project results are calculated for each “fire year,” which consists of sequential autumn and spring fire seasons. The main goal of our project is to reduce the area of the project area that burns. The area burned is estimated from satellite images on which burnt areas are easily distinguishable. The satellite images that we use are usually produced in May, just before SW Primorye starts to green-up and fires become extremely rare. In other words, with very rare exceptions, the satellite images show all areas that burned in SW Primorye during the previous spring and fall fire seasons.

In order to establish the percentage reduction of area burned in a given project-year we compare: 1) the percentage of the project area that actually burned, with 2) the percentage of the project area that would have burned in the absence of our fire management interventions. The latter we call the “expected burn percentage”. We use the following formula to calculate the reduction of the area burned in the project area:

$$\frac{\text{Expected burn percentage} - \text{Actual burn percentage}}{\text{Expected burn percentage}} = \text{The percentage reduction of burnt area}$$

The calculation of the “expected burn percentage” requires further explanation. This percentage is calculated as follows. Based on 12 years of SW Primorye fire data between 1996 and 2008 (i.e. before the start of the project), we have determined that, on average, the Slavyanka project area burns 48% less than the burns in the entire area of SW Primorye (see Figure 1). Therefore, if, for instance, 20% of SW Primorye burned in a project-year, then the “expected area burned” for that year in the Slavyanka project area would be $0,48 \times 20\% = 9.6\%$.

As an example we show below how the project result for 2010 was calculated:

- Actual percentage area burned in 2010 in all of SW Primorye: 19.87%
- Expected percentage area burned in the project area in 2010: $48\% \times 19.87\% = 9.51\%$
- Actual percentage of area burned in the project area in 2010: 1.61%
- Reduction in the percentage of the area that burnt in project area in 2010:

$$\frac{9.51\% - 1.61\%}{9.51\%} = 83\%$$